PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference OP04-1024	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. **PCT/KR2004/000774**	International filing date *(day/month/year)* **02 APRIL 2004 (02.04.2004)**	Priority date *(day/month/year)* 03 APRIL 2003 (03.04.2003)

International Patent Classification (IPC) or national classification and IPC

IPC7 A61K 38/16

Applicant

REGEN BIOTECH, INC.. et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demamd	Date of completion of this report
03 NOVEMBER 2004 (03.11.2004)	30 MAY 2005 (30.05.2005)

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International aplication No.
PCT/KR2004/000774

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☒ This report is based on translations from the original language into the following language English, which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☒ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this reort as "originally filed" and are not annexed to this report):*

   ☒ the international application as originally filed/furnished

   ☐ the description:
   pages _____ as originally filed/furnished
   pages* _____ received by this Authority on _____
   pages* _____ received by this Authority on _____

   ☐ the claims:
   pages _____ as originally filed/furnished
   pages* _____ as amended (together with any statment) under Article 19
   pages* _____ received by this Authority on _____
   pages* _____ received by this Authority on _____

   ☐ the drawings:
   pages _____ as originally filed/furnished
   pages* _____ received by this Authority on _____
   pages* _____ received by this Authority on _____

   ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
   ☐ the description, pages _____
   ☐ the claims, Nos. _____
   ☐ the drawings, sheets _____
   ☐ the sequence listing *(specify)* : _____
   ☐ any table(s) related to sequence listing *(specify)* : _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   ☐ the description, pages _____
   ☐ the claims, Nos. _____
   ☐ the drawings, sheets _____
   ☐ the sequence listing *(specify)*: _____
   ☐ any table(s) related to sequence listing *(specify)* : _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International aplication No.
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-12	YES
	Claims		NO
Inventive step (IS)	Claims	1-12	YES
	Claims		NO
Industrial applicability (IA)	Claims	9-12	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The following documents are referred to in this report.

D1: Int. J. Biochem. Cell Biol. Vol.29, No.5, pp.721-725, 1997
D2: J. Biol. Chem. Vol.277, No.48, pp.46159-46165, 2002
D3: J. Biol. Chem. Vol.275, No.40, pp.30907-30915, 2000

1. Novelty

The subject-matter of claims 1-12 is related to the use of peptides that interact with alpha v beta 3 integrin of endothelial cells. The said peptides are betaig-h3 itself and the fas-1 domains of betaig-h3. They inhibit endothelial cell adhesion and migration and, subsequently, have anti-angiogenic activity.
D1 discloses that alpha v beta 3 integrin mediates cell adhesion to extracellular matrix by recognizing the conserved arg-gly-asp(RGD) sequence of several plasma and matrix proteins and alpha v beta 3 is upregulated in response to vascular damage, during angiogenesis and in certain types of malignancy.
D2 discloses that all four of the fas-1 domains in betaig-h3 mediate MRC-5 fibroblast adhesion and this was specifically inhibited by a function-blocking monoclonal antibody specific for the alpha v beta 5 integrin.
D3 discloses that betaig-h3 proteins are highly active in mediating human corneal epithelial cell adhesion and spreading, and the functional receptor for betaig-h3 is alpha 3 beta 1 integrin.
None of D1-D3 discloses that betaig-h3 proteins with the sequences described in claims 1-12 of the present invention interact with alpha v beta 3 integrin of endothelial cells and inhibit endothelial cell adhesion, migration, and angiogenesis. Therefore, the subject-matter of claims 1-12 can be considered novel(Article 33(2) PCT).

2. Inventive Step

The fact disclosed in D2 and D3 that betaig-h3 proteins can interact with alpha v beta 5 integrin and alpha 3 beta 1 integrin does not imply the said proteins can also interact with alpha v beta 3 integrin since those integrins are known to be regulated by distinct growth factors in D1. (Continued on Supplemental Sheet)

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V.

Thus, those skilled in the art wouldn't be able to expect the betaig-h3 proteins with the sequences described in claims 1-12 can interact with alpha v beta 3 integrin to inhibit endothelial cell adhesion, migration, and angiogenesis. Therefore, the inventive step of claims 1-12 can be acknowledged(Article 33(3) PCT)

3. Industrial Applicability

The subject-matter of claims 1-8 relates to a method of therapeutic treatment. Concerning the assessment of the industrial applicability of the subject-matter relating to therapeutic applications, no unified criteria exist in the PCT. The patentability can also be dependent upon the formulation of the claims (Article 33(4) PCT).